Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] 1. A coupling device for use in detachably coupling a shoe upper to a shoe sole to enable a user to assemble and disassemble the shoe at will, the sole having a body having a foot-bearing topside bounded by at least one lateral side, the coupling device comprising:
(a) a socket, embeddable in the sole, the socket comprising:
(i) an inner wall, and outer wall, and two connecting side walls, forming a shaft having a slotted opening penetrable through a foot-bearing topside of the sole;
(ii) a tongue comprising a plurality of ratchet teeth, the tongue being resiliently movable from a unbiased engaged position and a biased disengaged position; and
(iii) a button, depressable by a finger of the user, the button having a first rest position and a second depressed position, the button being in direct communication with the tongue whereby when the button is in its rest position, the tongue is in its unbiased engaged position, and when the button is in the depressed position, the tongue is in its biased disengaged position; and
(b) a plug having a generally flat body and comprising:
(i) an upper portion affixable to the shoe upper; and

(ii) at least one prong insertable into the shaft through the slotted opening, the prong comprising a plurality of complementary ratcheted teeth that detachably engage with the ratcheted teeth of the tongue in its unbiased engaged position upon insertion of the plug into the shaft, thereby coupling the plug to the socket;

whereby when the button is depressed to its depressed position, the tongue moves to the biased disengaged position, whereupon the ratcheted teeth of the tongue disengage from the ratcheted teeth of prong, and thereby the plug is uncoupled from the socket.

[c2] 2. A coupling device according to claim 1, the socket further comprising a base closing the bottom of the shaft, and wherein the tongue is resiliently connected at a first end to at least one of the inner wall or the outer wall.

[c3] 3. A coupling device according to claim 2, wherein the tongue is resiliently connected at an upper end by a resilient bridge to the inner wall proximate the slotted opening.

[c4] 4. A coupling device according to claim 3, wherein the button communicates with the tongue by a stem joined to the button, the stem traversing the outer wall and connecting to a lower portion of the tongue.

[c5] 5. A coupling device according to claim 2, wherein the slotted opening is substantially level with the sole top-side.

[c6] 6. A coupling device according to claim 1, wherein the tongue comprises an upper portion and a lower portion having a surface facing the outer wall, the surface having two toothed surfaces, each comprising the plurality of ratcheted teeth, astride a middle portion to which the stem is connected.

[c7] 7. A coupling device according to claim 6, wherein the plug comprises two prongs depending from the upper portion and spaced apart by a slot arranged to straddle the stem when the plug is inserted into the shaft, the teeth of the prongs each engaging with the teeth surface of the tongue.

[c8] 8. A coupling device according to claim 2, wherein the socket walls, base, tongue, stem and button are integral in a single piece.

[c9] 9. A coupling device according to claim 8, wherein the socket is formed with a thin membrane sealing off the orifice from the shaft to prevent flowable resin from entering the socket during molding of the sole, the membrane being breakable by pressing the button after the

sole has been molded.

[c10] 10. A coupling device according to claim 9, wherein the button has a base end joined to the stem, the outer wall has an inner-facing surface, and the membrane joins the button base end and the inner surface of the outer wall.

[c11] 11. A shoe sole comprising an embedded socket of the coupling device according to claim 1, the sole having an orifice in a lateral side wall extending in to the embedded socket to house the button of the socket.

[c12] 12. A coupling device according to claim 9, wherein the socket is molded with an extended base sheet at the bottom thereof and with the socket initially open all the way through from top to bottom, the extended base sheet including a hinged portion adapted to be folded back to form the base closing off the socket bottom prior to molding the sole.

[c13] 13. A coupling device according to claim 2, wherein the socket walls and the button are enclosed in a cap, the cap comprising an outer resilient wall enclosing an air space environment surrounding the button.

[c14] 14. A coupling device according to claim 13, wherein the outer resilient wall of the cap is convexly curved to provide resilient inward flexure.

[c15] 15. A coupling device according to claim 8, wherein the single piece is enclosed within a cap, the cap including an outer resilient wall enclosing an air space environment surrounding the button.

[c16] 16. A coupling device for use in detachably coupling a shoe upper to a shoe sole to enable a user to assemble and disassemble the shoe at will, the sole having a body having a foot-bearing topside bounded by at least one lateral side, the coupling device comprising:
(a) a socket, affixed to one of the sole and shoe upper, the socket comprising:
(i) an inner wall, and outer wall, and two connecting side walls, forming a shaft having a slotted opening;
(ii) a tongue comprising a plurality of ratchet teeth, the tongue being resiliently movable from a unbiased engaged position and a biased disengaged position; and
(iii) a button, depressable by a finger of the user, the button having a first rest position and a second depressed position, the button being in communication with the tongue whereby when the button is in its rest position, the tongue is in its unbiased engaged position, and when the button is in the depressed position, the tongue is in its biased disengaged position; and
(b) a plug having a generally flat body and comprising:
(i) an upper portion affixed to the other of the sole or

shoe upper; and

(ii) at least one prong insertable into the shaft through the slotted opening, the prong comprising a plurality of complementary ratcheted teeth that detachably engage with the ratcheted teeth of the tongue in its unbiased engaged position upon insertion of the plug into the shaft, thereby coupling the plug to the socket;

whereby when the button is depressed to its depressed position, the tongue moves to the biased disengaged position, whereupon the ratcheted teeth of the tongue disengage from the ratcheted teeth of prong, and thereby the plug is uncoupled from the socket.

[c17] 17. A method for manufacturing a socket for embedding in the sole of a shoe and receiving for insertion therein a removable plug for coupling a detachable shoe upper to the sole to enable a user to assemble and disassemble the shoe at will, the socket comprising an inner wall, an outer wall, and two sidewalls each adjacent the outer and inner walls, and a base attached to bottoms of the walls, the walls and base enclosing a shaft having a slotted opening at the top of the socket generally level with the sole topside, the outer wall having a orifice therethrough, the socket further comprising:

(i) a tongue comprising a plurality of ratcheted teeth, the tongue attached to the inner wall and being resiliently

movable from a unbiased engaged position and a biased disengaged position; and

(ii) a button, depressable by a finger of the user, the button being in direct communication through the orifice with the tongue whereby the tongue is in its unbiased engaged position when the button is in its rest position, and the tongue is in its biased disengaged position when the button is in the depressed position, the button being positioned outside the outer wall and having a stem that traverses the outer wall and attaches to the tongue;

wherein the method comprises:

(a) molding integrally the socket walls, base, tongue and button into a single piece, wherein:

the base is molded as a flat sheet having:

a first base portion forming an open bottom end of the socket shaft,

a thin hinge portion along one side of the first portion, and

a second base portion joined by the hinge portion to the first portion; and

a frangible membrane affixed to the button and the outer wall to temporarily seal off the orifice in the outer wall of the socket;

(b) folding the second base portion back under the first base portion to form the base of the socket shaft, thereby forming an assembled socket;

(c) molding the assembled socket into a resin-based shoe sole using a flowable resin; and
(d) depressing the button, thereby breaking the frangible membrane.

[c18] 18. A method according to claim 17, further comprising the step of placing a cap over the assembled socket, the cap having an outer resilient wall enclosing an air space surrounding the button, thereby preventing flowable resin from entering the air space during molding of the sole.

[c19] 19. A method for manufacturing a shoe comprising a sole comprising a body having a foot-bearing topside bounded by at least one lateral side, at least one shoe upper detachably coupled to the sole, and a plurality of coupling devices for removably attaching the shoe upper to the sole to enable a user to assemble, disassemble and reassemble the shoe at will with exchangeable shoe uppers, the method comprising the steps of:
(A) attaching a plurality of a plug to a shoe upper, the plug having a generally flat body and comprising:
(i) an upper portion affixed to the shoe upper; and
(ii) at least one prong insertable into the shaft through the slotted opening, the prong comprising a plurality of complementary ratcheted teeth that detachably engage with the ratcheted teeth of the tongue in its unbiased

engaged position upon insertion of the plug into the shaft, thereby coupling the plug to the socket;

(B) providing a plurality of the sockets, a socket comprising

(i) an inner wall, an outer wall, and two sidewalls each adjacent the outer and inner walls, and a base attached to bottoms of the walls, the walls and base enclosing a shaft having a slotted opening at the top of the socket generally level with the sole topside, the outer wall having a orifice therethrough,

(ii) a tongue comprising a plurality of ratcheted teeth, the tongue attached to the inner wall and being resiliently movable from a unbiased engaged position and a biased disengaged position;

(iii) a button, depressable by a finger of the user, the button being in direct communication with the tongue whereby the tongue is in its unbiased engaged position when the button is in its rest position, and the tongue is in its biased disengaged position when the button is in the depressed position, the button being positioned outside the outer wall and having a stem that traverses the outer wall and attaches to the tongue; and

(iv) a frangible membrane affixed to the button and the outer wall to temporarily seal off the orifice in the outer wall of the socket;

(C) molding the socket into a resin-based shoe sole,

whereby the socket opening is level with the topside of the sole;

(D) depressing the button, thereby breaking the frangible membrane; and

(E) inserting the plurality of plugs of the shoe upper through the corresponding socket openings and into the socket shaft, thereby coupling the plug to the socket and attaching the shoe upper to the sole.

[c20] 20. A method according to claim 19, wherein in the step (B) of providing a plurality of the sockets, the socket further comprises the step of placing a cap over the socket, the cap having an outer resilient wall enclosing an air space surrounding the button, thereby preventing flowable resin from entering the air space during molding of the sole.